3.0 TECHNICAL ELEMENTS

This section provides a summary of the technical elements applicable to the cleanup of the site that are discussed in more detail in the RI/FS. This section summarizes the applicable or relevant and appropriate requirements (ARARs); the soil categories defined in the Environmental Media Management Plan (EMMP) prepared by Farallon dated April 6, 2000 (Appendix A); constituents and media of concern; and the selected cleanup levels.

3.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

A detailed evaluation of ARARs was presented in the RI/FS. Cleanup of the site will be conducted under an Agreed Order with Ecology which has incorporated the requirements of the ARARs for the site. Ecology will be the lead agency for compliance with the State Environmental Protection Act (SEPA) and will determine the substantive requirements of local permits. As defined in the EMMP, Ecology has agreed to specific criteria for waste management of contaminated soil generated from the site to obtain the contained-in designation for some of the soil to be excavated from the site. The EMMP has grouped the contaminated soils into four categories based on *in-situ* soil sampling analytical results, and it has provided criteria for the classification and disposal of each category of contaminated soil in accordance with the principles of the contained-in policy and dangerous waste regulations. A copy of the EMMP is included in Appendix A.

ARARs identified for the site in the RI/FS include:

- MTCA (Chapter 70.105D RCW);
- MTCA Cleanup Regulations (Chapter 173-340 WAC);
- MTCA Cleanup Levels and Risk Calculations Update (CLARC II);
- Hazardous Waste Management Act (Chapter 70.105 RCW);
- Dangerous Waste Regulations (Chapter 173-303 WAC);
- Ecology "Contained-In" Policy;
- State Environmental Policy Act (Chapters 197-11 and 173-802 WAC);
- King County Industrial Waste Regulations (Ordinance No. 11034);
- City of Kenmore Grading Permit;
- Health and Safety-29 CFR Part 1910.120; 8 CCR 5192 and USEPA Standard Operating Safety Guides for Hazardous Waste Operations (1986); and,
- Minimum standards for Construction and Maintenance of Wells (Chapter 173-160 WAC).

The primary ARARs that are applicable to the site are:

- MTCA Cleanup Regulations (Chapter 173-340 WAC);
- MTCA Cleanup Levels and Risk Calculations Update (CLARC II);
- Dangerous Waste Regulations (Chapter 173-303 WAC); and,

- Ecology "Contained-In" Policy.

The applicability of the primary ARARs to the site cleanup and disposal options is discussed below.

3.1.1 MTCA

The multiple constituents and residential land use and zoning of the site requires the use of MTCA Method B residential soil cleanup levels (WAC 173-340-700(3)(b)). MTCA Method B has been selected as the primary ARAR for selection of cleanup levels based on the multiple chemicals detected within the soil, the uses of the site, and applicable zoning regulations. The MTCA Method B residential soil cleanup levels used for this CAP are based on the carcinogenic formula values set forth in the MTCA Cleanup Levels and Risk Calculations (CLARC II) updated February 1996.

3.1.2 Dangerous Waste Regulations

Based on the identified chemicals used at the site, the dangerous waste regulations (Chapter 173-303 WAC) are applicable to the off-site disposal of contaminated soil removed from the site. The following chemicals of concern identified in the RI/FS are listed wastes under the Discarded Chemical Products List (WAC 173-303-9903):

Compound	Dangerous Waste No.
Aldrin	P004
Chlordane	U036
DDT	U061
Dieldrin	P037
Endrin Ketone	P051
Heptachlor	P059

Based on Discarded Chemical Products, WAC 173-303-081, soil waste with concentrations of one or more of these compounds generated from the site cleanup would be designated a dangerous waste and would be subject to the restrictions of Chapter 173-303 WAC. These restrictions would include a land-ban disposal of all the soil waste generated from the site, thus requiring incineration as the only disposal option; however, Ecology has confirmed that a Contained-In Determination is applicable to some of the soils to be excavated from the site, as discussed below.

3.1.2.1 Contained-In Designation

The applicability of the Contained-In Designation by Ecology to some of the soil to be excavated from the site is based on the following soil categories for contingency management:

- Concentrations of one or more of the target pesticides in the soil do not exceed the Dangerous Waste Characteristics levels (WAC 173-303-090); and,
- Concentrations of one or more of the target pesticides in the soil do not exceed the Dangerous Waste Criteria levels (WAC 173-303-100).

Based on these criteria, Ecology, in consultation with the United States Environmental Protection Agency (EPA), has agreed to apply the Contained-In Designation to some of the soil waste to be excavated from the site (Ecology letter dated March 7, 2000) as discussed in the EMMP.

3.1.2.2 Soil Categories

Farallon has prepared an EMMP (Appendix A) that provides a detailed discussion of the contingency management plan for the handling, transporting, and disposing of the soil waste generated from the site in order to meet the requirements of the Contained-In Designation by Ecology. The EMMP defines the disposal facility and categories of soil for handling and transportation. The determination of the soil category for the soil waste is dependent on the analytical result of *in-situ* soil samples. Category 1 and 2 Soils will be designated as contained-in and disposed of as non-dangerous waste in accordance with the EMMP. Collection and analysis of *in-situ* soil samples for Toxicity Characteristic Leaching Potential (TCLP) is necessary to determine the disposal option for the Category 3 Soils. Category 4 Soils will be designated as dangerous waste and disposed of in accordance with the Chapter 173-303 requirements as defined in the EMMP.

The analytical results of soil samples summarized in the RI/FS with concentrations of one or more of the target pesticides above the MTCA Method B cleanup levels are summarized on the attached Table 1. Table 1 also includes the equivalent concentrations for state toxicity criteria for pesticide constituents in each soil sample. A summary of the analytical results of all soil samples collected at the site, laboratory analytical reports, and sample locations are included in the RI/FS Report. The following soil categories have been defined for the site:

Category 1 Soils:

- Concentrations of one or more of the target pesticides are above the MTCA Method B residential soil cleanup levels;
- Concentrations of dieldrin are equal to or less than 1,300 micrograms/kilogram (ug/kg);

- Concentrations of chlordane are equal to or less than 2,600 ug/kg;
- Equivalent concentration for state-only toxicity is equal to or less than 0.01%; and,
- Total halogenated organic compounds (HOCs) for state-only persistence is less than 0.01%.

The analytical results of soil samples collected from the site that meet the criteria of Category 1 Soils are summarized on Table 2.

Category 2 Soils:

- Concentrations of one or more of the target pesticides are above the MTCA Method B residential soil cleanup levels;
- Concentrations of dieldrin are greater than 1,300 ug/kg, but equal to or less than 10,000 ug/kg;
- Concentrations of chlordane are greater than 2,600 ug/kg, but equal to or less than 15,000 ug/kg;
- Equivalent concentration for state-only toxicity is equal to or less than 0.01%; and,
- Total HOCs for state-only persistence is less than 0.01%.

The analytical results of soil samples collected from the site that meet the criteria of Category 2 Soils are summarized on Table 3.

Category 3 Soils:

- Concentrations of one or more of the target pesticides are above MTCA Method B residential soil cleanup levels;
- Concentrations of dieldrin are equal to or less than 10,000 ug/kg;
- Concentrations of chlordane are greater than 15,000 ug/kg, but pass the TCLP criteria;
- Equivalent concentration for state-only toxicity is equal to or less than 0.01%; and,
- Total HOCs for state-only persistence is less than 0.01%.

The analytical results of soil samples collected from the site that meet the criteria of Category 3 Soils are summarized on Table 4.

Category 4 Soils:

Category 4 Soils are designated as dangerous waste, which contains concentrations of one or more target pesticides above MTCA Method B residential soil cleanup levels and meets any one of the following criteria:

- Concentrations of dieldrin are greater than 10,000 ug/kg; or,
- Concentrations of chlordane are greater than 15,000 ug/kg, and fail the TCLP criteria; or,
- Equivalent concentration for state-only toxicity is greater than 0.01%; or,
- Total HOCs for state-only persistence is equal to or greater than 0.01%.

The analytical results of soil samples collected from the site that meet the criteria of Category 4 Soils are summarized on Table 5.

3.2 LOCAL PERMITS/SUBSTANTIVE REQUIREMENTS

The site cleanup will be performed under an Agreed Order with Ecology. When site cleanup is performed under an Agreed Order, compliance with the procedural aspects of certain state permits and all local permits or approvals is not required. Instead, Ecology determines and applies the substantive requirements of the local permits or approvals. Included with this CAP are the permit applications that would be required by local regulatory agencies in the absence of the Agreed Order exemption as described below.

3.2.1 Grading Permit

The city of Kenmore requires a grading permit for excavations greater than 50 cubic yards, a State Environmental Protection Act (SEPA) checklist and a determination of non-significance (DNS) for excavations greater than 500 cubic yards. The expected volume of soil to be excavated from the site is greater than the 500 cubic yards and would require the SEPA determination from the city of Kenmore. Under the Agreed Order, Ecology will be the lead agency for approval of the substantive equivalent permit requirements. A copy of the substantive requirements under the grading permit application and SEPA checklist are attached in Appendix B. A 30-day public comment period is required for the SEPA checklist. The 30-day public comment period will run concurrently with the comment period required by the Agreed Order. Ecology will issue a DNS for the site cleanup at the end of the 30-day comment period unless Ecology determines that public comment or other concerns require a different result.

3.2.2 Wastewater Disposal Permit

Disposal of wastewater generated from the site, which will include decontamination washwater, recovered perched groundwater in the vadose zone, and captured stormwater, requires a Discharge Authorization (DA) with King County Department of Natural Resources Industrial Waste Program. A DA has been obtained for the Interim Actions at the site and will be extended under the Agreed Order for the site cleanup. A copy of which is attached in Appendix B. The discharge and monitoring requirements of the DA will be followed during the site cleanup.

3.3 CONSTITUENTS OF CONCERN

The constituents of concern (herein referenced as the target pesticides) were identified based on a comparison of the analytical results of soil samples collected by the previous investigations, interim actions and the RI/FS with MTCA Method B residential soil cleanup levels, ARARs, and discussions with Ecology. A total of nine pesticides with established MTCA Method B residential soil cleanup levels, per the formula values listed in CLARC II, Chapter 173-340 WAC, were detected in soil samples collected during the previous investigations, the interim actions, and the RI/FS.

These nine pesticides comprise the constituents of concern (target pesticides):

- chlordane (alpha and gamma isomers);
- dieldrin;
- aldrin;
- endrin;
- heptachlor;
- heptachlor epoxide;
- DDT;
- DDD; and,
- gamma and delta hexachlorocyclohexane (lindane and delta BHC).

3.4 MEDIA OF CONCERN

3.4.1 Soil

Soil has been identified as the medium of concern based on results of prior investigations, interim actions, and the RI/FS.

Groundwater was not encountered during any of the previous investigations, interim actions, or the RI/FS. The regional groundwater-bearing zone is expected to occur at depths greater than 50 feet bgs beneath a relatively impermeable layer of glacial till. The results of a soil boring (SB-1) conducted at the site subsequent to completion of the RI/FS, the characteristic limited mobility of pesticides in soil, the low permeability of the soil, regional depth to groundwater, and the results of soil sampling at depth, suggest that groundwater beneath the site is probably not affected by pesticides from the site and does not appear to be a medium of concern.

3.4.2 Perched Groundwater in the Vadose Zone

The CAP (Farallon 2000) defined perched groundwater in the vadose zone as a medium of concern based on the analytical results of water samples collected from the Buffer Zone interceptor trench installed prior to the final cleanup action performed in June 2000. However, subsequent results of the quarterly compliance monitoring during 2001 of the perched groundwater in the vadose zone sumps, S-1 through S-7, and the installation and monitoring of monitoring well MW-1 in 2003 on the adjacent Preschool Property have confirmed that there is no continuous perched groundwater-bearing (saturated) zone present in the vadose zone soils at the Site. Therefore, Ecology has determined that vertical or lateral migration of target pesticides in perched groundwater in the vadose zone is not an ~~migration~~ exposure~~?~~ pathway at the Site. However, re: idual interstitial water ~~is~~ may occasionally be present in sumps or wells at the Site but is not considered ~~be a true~~ groundwater in a saturated soil within the vadose ~~bearing~~ zone. Based on this determination, perched groundwater in the vadose zone is not a medium of concern.

~~The perched groundwater in the vadose zone has been identified as a medium of concern based on the analytical results of perched groundwater in the vadose zone samples collected from the buffer zone interceptor trench. The perched groundwater in the vadose zone appears to be limited to the wet season based on observations and perched groundwater in the vadose zone monitoring by Farallon during 1999.~~

3.5 CLEANUP STANDARDS

Cleanup standards for the site, as defined in WAC 173-340-700, include establishing cleanup levels and points of compliance at which the cleanup levels will be attained for the site to meet the requirements of the Agreed Order. The cleanup standards have been established for the site in accordance with MTCA (WAC 173-340-700 through WAC 173-340-760), which are protective of human health and the environment and comply with the cleanup standards and ARARs to meet the requirements of satisfaction of the Agreed Order.

3.5.1 Cleanup Levels

Cleanup levels are the conecntrations of the target pesticides that will be met at the points of compliance defined for the site to meet the requirements of the Agreed Order. Cleanup levels have been established for the target pesticides in soil ~~and perched groundwater in the vadose zone~~. The cleanup levels ~~are presented by media of concern in~~ for soil ~~and groundwater~~ are presented below. ~~the following sections. (~~

3.5.1.1 Soil

The cleanup levels for soil applicable to the site are based on MTCA Method B residential soil cleanup levels using the carcinogenic formula values listed in CLARC II. The carcinogenic formula values were selected because they are more conservative and more protective of human health and the environment than the non-carcinogenic formula values. This higher level of protection is warranted because of the existing and planned future residential use of the site and site vicinity. The cleanup levels for the target pesticides are included in table 6.

~~3.5.1.2 Perched Groundwater in the Vadose Zone~~

~~Perched groundwater in the vadose zone cleanup levels applicable to the site are the MTCA Method B cleanup groundwater levels. The cleanup levels for the constituents of concern for each respective compound are included on table 6.~~

3.6 POINTS OF COMPLIANCE

The points of compliance are the locations where cleanup levels for the media and constituents of concern must be attained to meet the requirements of the Agreed Order. This CAP has established points of compliance for ~~perched groundwater in the vadose zone [WAC 173-340-720(6)] and~~ soil [WAC 173-340-740(6)] at the site.

3.6.1 Soil

The points of compliance for soil at the site are defined as all soils within the site where analytical results of *in-situ* soils samples detect concentrations of one or more of the target pesticides above MTCA Method B residential soil cleanup levels shown on table 6.

~~**3.6.2 Perched Groundwater in the Vadose Zone**~~

~~The points of compliance for perched groundwater in the vadose zone are defined as sumps to be located on the west, south, and east property boundaries of the 62nd Avenue Property. The sump locations, construction details, and sampling protocols are summarized in more detail in the SAP in Appendix C.~~

3.7 SITE CLOSURE

The requirements for a site closure and removal from The Hazardous Site List by Ecology will be met by the completion of the cleanup action. All soil with concentrations of one or more of the target pesticides above the applicable cleanup levels will be removed from the site. Compliance monitoring will be conducted to confirm the long term effectiveness of the cleanup action on soil and pPerched groundwater in the vadose zone. The cleanup action will meet the requirements of the Agreed Order and will not include a deed restriction or institutional controls once the cleanup levels are met at the defined points of compliance.